Hydroxymethylated Resorcinol Coupling Agent for Enhanced Durability of Bisphenol-A Epoxy Bonds to Sitka Spruce

Abstract:
Epoxy adhesives can develop bonds to wood that are as strong as the wood itself, but only if the bonds remain dry. Once exposed to repeated water soaking and severe stresses from drying, epoxy bonds delaminate and fail to meet requirements for structural wood adhesives intended for exterior exposure. A new hydroxymethylated resorcinol (HMR) coupling agent, applied to lumber surfaces before bonding, chemically couples both epoxy adhesive and lignocellulosics of wood to produce bonds to Sitka spruce that are extraordinarily resistant to delamination. In this report, we explain and demonstrate the nature of this coupling agent and the mechanism by which it enhances the durability of bonds of a bisphenol-A epoxy adhesive to wood. When diluted with benzyl alcohol, an epoxy adhesive developed structural bonds in HMR-primed lumber laminates that met the 5% maximum delamination requirement of ASTM Specification D 2559. The USDA Forest Service has applied for a patent for this invention.

Stichworte:
Hydroxymethylated resorcinol; coupling agent; bisphenol-A epoxy; polyethylenimine; primer; Sitka spruce; delamination resistance

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